

NON-PUBLIC?: N  
ACCESSION #: 9109100207  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Susquehanna Steam Electric Station - PAGE: 1 OF 03  
Unit 2

DOCKET NUMBER: 05000388

TITLE: Automatic Unit SCRAM From Full Power  
EVENT DATE: 08/06/91 LER #: 91-012-00 REPORT DATE: 09/05/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: J. J. Meter - Engineer II TELEPHONE: (717) 542-1873

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: SB COMPONENT: SHV MANUFACTURER: GE  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At 0727 hours on August 6, 1991 Unit 2 received simultaneous SCRAM and dual recirculation pump trip signals causing an automatic unit shutdown. All plant systems responded as expected in response to the transient. All reactor parameters were stabilized and the SCRAM was reset by 0740. The event was initiated when three of four main turbine stop valves (EHS code: SB) unexpectedly closed far enough to produce Reactor Protection System (RPS) and End of Cycle-Recirculation Pump Trip (EOC-RPT) signals that the stop valves had closed. The stop valve closure signal was due to water intrusion into an electrical junction box causing a short-circuit in the Unit 2 turbine stop valve (TSV) control logic. The source of the water was a sealing steam leak from the #2 stop valve. The water-damaged components were replaced and post maintenance testing was performed. A temporary deflection shield was installed to inhibit water intrusion of the panel. Further modifications to prevent recurrence were implemented during a subsequent

non related Unit shutdown on 8/22/91 (non reportable). Maintenance was performed on the #2 stop valve during the shutdown. On 8/28/91, during Unit startup, the #2 TSV was inspected and no leakage was found. Since all plant systems responded per design in response to the transient, there were no safety consequences or compromises to health or safety of the public.

#### DESCRIPTION OF EVENT

At 0727 hours on August 6, 1991 with Unit 2 operating at 100% power, simultaneous RPS SCRAM and dual EOC-RPT signals were received due to partial

#### END OF ABSTRACT

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closure of the number one, three and four main turbine stop valves. The signals caused an automatic unit shutdown. All control rods fully inserted as expected. The reactor was stabilized in accordance with operating procedures. Reactor water level was maintained between (+) 42 inches and (-) 3.5 inches using the normal main feedwater system.

The designed primary containment isolations (EHS Code: JM) functioned as expected when water level reached (+) 13 inches. Reactor pressure was controlled using main steam bypass valves to the main condenser (EHS Code: SG) and was stabilized at 920 psig. There were no main steam safety relief valve actuations and no other automatic isolations or initiations. The reactor scram was reset by 0740 and the Unit was maintained in Hot Shutdown mode while the cause of the SCRAM was investigated. Based upon investigation results, a main turbine stop valve control logic relay was replaced and post maintenance testing was performed. Unit 2 was returned to startup (mode 2) at 0310 on 8/7/91.

At 2109 on 8/7/91, with Unit 2 operating at 16% power, while preparing to place the generator on line, an operator (licensed, utility) observed the number one, three and four main turbine stop valves closing. The operator manually closed all the turbine stop valves per procedure. There were no ESF actuations per plant design. The Unit remained in condition 1 while the event was investigated. The investigation found the root cause of the unexpected stop valve movement to be a water induced short-circuit in the stop valve control logic. Repairs were completed and Unit 2 returned to electrical power generation at 2148 on 8/8/91.

#### CAUSE OF EVENT

An event review team was established to evaluate the shutdown. The cause of the SCRAM was determined to be that the number one, three, and four main turbine stop valves (TSV) (EHS Code: SB) partially closed. The partial closure of these valves initiated Reactor Protection (EHS Code: JC) logic which in turn caused the Unit SCRAM and both reactor recirculation pumps (EHS Code: AD) to trip.

The one, three, and four TSV's partially closed due to an erroneous signal generated by the number two TSV valve control logic. The number two TSV is master to the remaining TSV's. That is, the number two valve will open (or close) first then initiate logic to cycle the remaining valves to the appropriate position (master/slave relation).

The erroneous signal generated in the number two TSV control logic was originally determined to be due to a faulty relay based on plant conditions at that time. A subsequent investigation showed the erroneous signal occurred when water entered an electrical panel mounted to the number two TSV. The water short-circuited connections on terminal blocks in the panel. This short-circuit momentarily simulated a number two TSV closure and the remaining TSV's partially closed enough to initiate the Reactor Protection System (RPS) and EOC-RPT logic (EHS Code: AD).

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The source of the water was determined to be a sealing steam (EHS Code: KO) leak from the number two turbine stop valve. The water made its way into the electrical panel via a valve actuator arm penetration. A buildup of oxides on the terminal blocks along with the water then caused a short-circuit on the terminal block. Since the stop valve only leaks in the open position, at normal reactor pressure, the water path was absent during original investigation when the Unit was shutdown and the stop valves were closed. An evaluation of the initial investigation showed that the conclusions reached were appropriate based upon the evidence available at that time.

#### CORRECTIVE ACTIONS

Operations entered applicable operating procedures and stabilized reactor parameters. The reactor SCRAM was reset by 07:40 on 8/6/91. The effected terminal blocks as well as other components were replaced in the number two main steam stop valve electrical panel. Post maintenance testing was conducted to ensure proper operation of the stop valves. A temporary leakage collection system was installed to inhibit water intrusion. Further enhancements to prevent recurrence were

implemented during a subsequent non-related Unit shutdown on 8/22/91 (non-reportable). Modifications in the area of the stop valve electrical panel included mounting a water deflector shield above the panel and eliminating connections to terminal blocks for the number two TSV master/slave limit switch wiring. A valve gland gasket was replaced on the number two TSV. On 8/28/91, during Unit startup, the number 2 TSV was inspected and no leakage was found.

#### REPORTABILITY/ANALYSIS

This event was determined to be reportable under 10CFR50.73(a)(2)(iv) in that an automatic actuation of an Engineered Safety Feature resulted in a Unit Shutdown.

In accordance with the guidance provided in NUREG 1022 Supplement 1 item 14.1 and 10CFR50.4(d) the required submission date for this report was determined to be September 5, 1991.

Since all plant systems and components functioned properly and per design in response to the transient, there were no safety consequences or compromises to the health or safety of the public.

#### ADDITIONAL INFORMATION

Failed component identification: Main Turbine Stop Valve gasket

MANUFACTURER: General Electric  
MODEL: 8438777

ATTACHMENT 1 TO 9109100207 PAGE 1 OF 1

PP&L Pennsylvania Power & Light Company  
Two North Ninth Street o Allentown, PA 18101 o 215/770-5151

September 5, 1991

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 91-012-00  
FILE R41-2  
PLAS - 499

Docket No. 50-388  
License No. NPF-22

Attached is Licensee Event Report 91-012-00. The event was determined reportable per 10CFR50.73(a)(2)(iv) in that an automatic actuation of an Engineered Safety Feature (the Reactor Protection system) resulted in a Unit SCRAM.

H. G. Stanley  
Superintendent of Plant - Susquehanna

JJM/mjm

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